

## Departmental Colloquium

### *Images, PDEs and hierarchical construction of solutions with critical regularity*

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**Abstract:** Edges are noticeable features in images which can be extracted from noisy data using different variational models. The analysis of such models leads to the question of representing general  $L^2$ -data as the divergence of uniformly bounded vector fields.

We use a multi-scale approach to construct uniformly bounded solutions of  $\operatorname{div} U=f$  for general  $f$ 's in the critical regularity space  $L^2(T^2)$ . The study of this equation and related problems was motivated by recent results of Bourgain & Brezis. The intriguing critical aspect here is that although the problems are linear, construction of their solution is not. These constructions are special cases of a rather general framework for solving linear equations in representations  $U=\sum_j u_j$  which we introduced earlier in the context of image processing, yielding a multi-scale decomposition of "image"  $U$ .

Friday, October 6 at 3:00 PM in SEO 636